Art. VI.—THE DECUSSATION OF THE SPINAL INHIBITORY FIBRES.

By Isaac Ott, M. D.,
and
Robt. Meade Smith, A. M., M. D.,
Demonstrator of Experimental Physiology, University of Pennsylvania, Member of the Academy of Natural Sciences.

Gluge first noticed a rhythm of the sphincter ani in a rabbit paralyzed by an accidental injury in the lumbar region, while Goltz, unaware of Gluge's observation, noticed it in a dog after division of the cord in the dorsal region. One * of us has shown in another place, that in the optic thalami are centres which inhibit rhythmical contraction of the anal and vaginal sphincters, and that the fibres arising in these centres pass down the cord in the lateral columns; it is by the division of these fibres that the rhythm is set up. The following experiments were undertaken to determine if these fibres decussated, and if so, where.

Method :—Cats of large size were selected, since in them the rhythm is most strongly marked after division of the cord, fastened on Czermak's holder and tracheotomy performed. The tracheal canula was then connected with a Wolff bottle containing ether, and when the animal was thoroughly anæsthetized the skull was trephined and a hemisection of the brain made with a curved knife immediately behind the thalamus. The spinal cord was then exposed and a hemisection or division of one lateral column made at the junction of the lumbar and dorsal regions; care was taken never to get below this point, so the ano-spinal centre was not interfered with. After allowing the effects of the ether to pass off, the phenomena resulting from the operation were noted for an hour or two, and the animal then killed, and the brain and cord

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by the destruction of the efferent inhibitory nerves EE, running down the lateral columns. For the sensory fibres CC behind the hemisection are still intact, and passing up the opposite side of the cord maintain the reflex activity of the inhibitory centre A, which by its efferent fibres EE, inhibits the parts in front of the hemisection, while the irritation of the sensory fibres DD in the act of hemisection may serve to explain the transient anæsthesia often observed in such instances in the entire opposite side, and not only in the parts of which the sensory nerves have been divided. Koch * has proved that bodies lying in front of the medulla oblongata, when removed, produce hyperæsthesia; for when the whole brain anterior to the medulla was removed, hyperæsthesia and an increase of reflex activity appear. His statement that this hyperæsthesia is still further increased by hemisection of the cord does not disprove the view of reflex-inhibitory centres anterior to the medulla oblongata. As regards the action of drugs on this inhibitive apparatus, we have been able so far only to test the action of atropia, and found that the rhythm occurred very strongly in a large female cat one hour after the hypodermic injection of two grains of sulphate of atropia. We do not yet feel prepared to infer positively from this experiment that atropia paralyzes the inhibitory apparatus, though it would be in accordance with its action on other inhibitory mechanism, for it may produce the rhythm by exciting the sphincter ani reflex mechanism in such a degree as to overcome the inhibition from the brain. Bleeding also in dogs brings on a marked rhythm, and quite probably here acts by weakening the inhibitory apparatus, thus explaining the hyperæstheia observed in animals after bleeding; when the rhythm has appeared after bleeding, it can still be arrested by electric stimulation of the sciatic. These facts about the innervation of the sphincter ani serve to explain these rare cases in man described by Prof. D. H. Agnew, of sphincterismus, and inability to coördinate the muscles concerned in defecation. The temporary closure of the laboratory† for the summer, has interrupted our experiments.

* *Virchow's Archiv*, 1878.

† Physiological Laboratory, University of Pennsylvania.